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Multisite Transfusions for Sickle Cell Disease: Georgia, 2007-2016

Georgia Health Policy Center

Multisite Transfusions for Sickle Cell Disease: Georgia, 2007–2016[1]

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Georgia has one of the largest populations of patients with sickle cell disease (SCD) in the nation. Optimal treatment for many patients includes blood transfusions. To prevent some SCD-related complications, such as stroke, patients can be treated with regularly scheduled transfusions. These are typically received in an outpatient setting under the supervision of a regular provider. However, sometimes urgent transfusions are needed for SCD-related complications and these one-time transfusions may be given in an emergency department or in the hospital. These unplanned, intermittent transfusions may occur at multiple sites over time.

Even with appropriate pretransfusion testing, blood transfusions still carry the risk of complications. Alloimmunization, triggered by the recipient's immune reaction to foreign (donor) antigens in the transfused blood, is a risk for patients with SCD that increases when patients receive multiple transfusions over their lifetime, especially when a complete transfusion history is not available to providers.[2,3,4] Preventing alloimmunization is critical, as it can limit future transfusion options or even lead to death. Another serious complication of receiving multiple blood transfusions is iron overload. While partially treatable with medications, this risk may be overlooked by a provider who is unaware of a patient's lifetime transfusion history.

Methods

Using data from the Sickle Cell Data Collection Program, the REdHHoTT project* characterized the use of intermittent transfusions for SCD patients in emergency departments and inpatient hospitals[5] in Georgia from 2007 to 2016. Intermittent transfusions administered in emergency departments and inpatient settings represent about one-third of all SCD-related transfusions documented in the state.[6] Understanding the frequency of intermittent transfusions and where patients are receiving them is critical to informing efforts to reduce transfusion-associated complications.

Findings

A total of 8,529 unique SCD patients were identified in Georgia hospital discharge records from 2007 to 2016.[7] Of these, 4,584 patients had at least one transfusion in an emergency department or inpatient setting during the 10-year period, and more than two-thirds of these transfused patients (n = 3,073) received multiple transfusions (Figure 1).

Figure 1: Number of intermittent transfusions among SCD patients, 2007-2016 (n = 8,529)

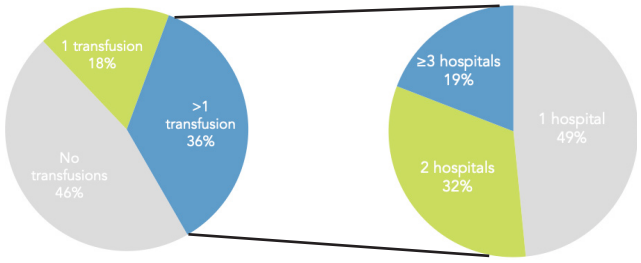

Figure 2: Number of hospitals providing transfusions to SCD patients who received more than one intermittent transfusion, 2007-2016 (n = 3,073)

[1] Based on: Tang, A., Branscomb, J., Zhou, M, et al. (2019). Characterizing complication risk from multisite, intermittent transfusions for the treatment of sickle cell disease. *Pediatric Blood & Cancer.*

[2] Harm, S. K., Yazer, M. H., Monis, G. F., & et al. (2014). A centralized recipient database enhances the serologic safety of RBC transfusions for patients with sickle cell disease. *American Journal of Clinical Pathology*, 141(2), 256-261.

[3] Delaney, M., Dinwiddie, S., Nester, T. N., & Aubuchon, J. A. (2013). The immunohematologic and patient safety benefits of a centralized transfusion database. *Transfusion*, 53, 771-776.

[4] Yazdanbakhsh, K., Ware, R. E., & Noizat-Pirenne, F. (2012). Red blood cell alloimmunization in sickle cell disease: pathophysiology, risk factors, and transfusion management. *Blood*, 120, 528-537.

[5] Analysis used hospital discharge data (emergency department and inpatient). Patients receiving transfusions in outpatient clinic settings are not captured.

[6] Georgia Health Policy Center. Analysis of 2004-2008 Medicaid claims.

[7] SCD case definition included individuals who had three or more encounters with an SCD diagnosis codes for the visit.

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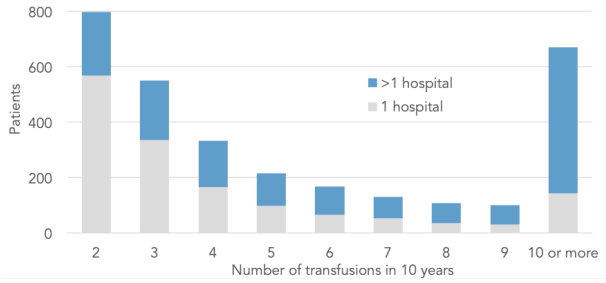
Fewer than half of SCD patients who had multiple transfusions received all of them at a single hospital, and nearly one in five (n = 589 patients) received transfusions at three or more sites (Figure 2). The likelihood of multisite transfusions increased with the total number of transfusions received (Figure 3). Whereas roughly one-third of the 996 patients who had two intermittent transfusions over the 10 years received them at different hospitals, nearly 80 percent of the 671 patients who had 10 or more received them at multiple sites.

While 30 percent of patients who received multisite transfusions were between 18 and 25 years of age and presumably transitioning from pediatric to adult facilities, the rate was similar in patients ages 26 to 40 years, suggesting age-related transition from pediatric to adult care is not solely responsible for these findings. These results also highlight the need to address alloantibody history during transition planning.

Implications

Given the lack of a statewide system to share patient transfusion histories across hospitals, this likely leads to increased risks of transfusion complications such as alloimmunization. Prior case reports from Georgia demonstrated the potentially fatal consequences of patients receiving transfusions without their alloantibody history being known.[8]

Figure 3: Patients receiving transfusions at one or multiple locations by number of cumulative transfusions received in 10 years (N=3,073 SCD patients who received 2 or more in-hospital transfustions between 2007 and 2016)



Though a handful of Georgia hospitals are high-volume intermittent transfusion providers for SCD patients, many others average less than one such transfusion per year. With limited experience, provider knowledge and practice may not be current with the latest evidence-based practice recommendations.

The National Heart, Lung, and Blood Institute's 2014 expert panel report, *Evidence-Based Management of Sickle Cell Disease*, recommends that providers obtain an accurate transfusion history, including locations of prior transfusions and any previous adverse effects.[9] This requires interviewing the patient and contacting blood banks that provided previous transfusions. This is a cumbersome manual process fraught with challenges that may limit the ability to thoroughly summarize the patient's transfusion exposures. However, it is critically necessary, as some previous alloantibodies could be present at levels too low for detection, but could be reactivated and pose a lethal threat.[2,3] An accurate transfusion history is essential to reducing the risk of transfusion-related complications, particularly for patients with SCD receiving care from more than one provider.

Previous studies show that a centralized regional or statewide transfusion database can enhance transfusion safety, particularly for patients seen at multiple institutions.[2,3,4] REdHHoTT is assessing the feasibility of implementing a transfusion data warehouse. These software applications are designed to interface with hospital blood bank data systems, retrieving select information on transfusions and storing it in a cloud-accessible database for access by future providers. Secondly, REdHHoTT has produced a web-based course for providers to improve knowledge and adherence to practice recommendations in transfusion for SCD patients. Finally, the project is developing a campaign to inform patients about the need to know and carry their transfusion history information, whether on a physical form, in an app, or in a photograph of blood bag information.

Conclusion

These findings show that almost one in five patients living with SCD in Georgia receive intermittent transfusions at multiple hospital sites. Based on the findings, there are two priority areas where policymakers can enhance intermittent transfusion safety: development of a statewide transfusion registry, or other data-sharing system, so that providers have immediate access to accurate transfusion history information, and patient education to enhance health decisions and self-advocacy. Finally, as highlighted in a previous brief,[10] improved access to coordinated care for patients with SCD could reduce their need to seek treatment in emergency departments for transfusions and other concerns.

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[8] Nickel, R.S., Hendrickson, J.E., Fasano, R.M., et al. (2016). Impact of red blood cell alloimmunization on sickle cell disease mortality: a case series. *Transfusion*, 56(1): 107-114.

[9] National Heart, Lung, and Blood Institute. (2014). Evidence-based management of sickle cell disease: Expert panel report, 2014. Accessed at https://www.nhlbi.nih.gov/sites/default/files/media/docs/sickle-cell-disease-report%20020816_0.pdf

[10] Georgia Health Policy Center. (2018). Sickle Cell Data Collection brief: Better access to outpatient care may decrease emergency visits and costs. Georgia Health Policy Center, Atlanta, Ga. Accessed at https://ghpc.gsu.edu/download/sickle-cell-data-collection-program-brief/

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